ACCESSION NR: AP4020972 S/0051/64/016/003/0536/0538

AUTHOR: Bazhulin, P. A.; Maly*shev, V. I.; Markin, A. S.; Rakov, A. V.; Bagdasarov, Kh. S.

TITLE: Investigation of the luminescence and stimulated emission spectra of different CaF_2 crystals doped with U^{3+}

SOURCE: Optika i spektrokopiya, v. 16, no. 3, 1964, 536-538

TOPIC TAGS: stimulated emission, laser, uranium ion luminescence, trivalent uranium, trivalent uranium emission, trivalent uranium luminescence, calcium fluoride, uranium doped calcium fluoride, luminescence center, lasing center

ABSTRACT: Investigators (P.P.Sorokin and M.J.Stevenson, Phys.Rev.Letters, 5, 557, 1960; and Adv.in Quant.Electr. 65, 1961) have observed stimulated emission (laser output) from $CaF_2:U^{3+}$ crystals, but in different specimens exhibit different wavelengths (2.5, 2.6, and 2.24 mμ). These differences are attributed to different symmetry of the field about the U^{3+} ions in the crystal lattice. The authors investigated different $CaF_2:U^{3+}$ crystals grown at the Institute of Crystallography of the Academy of Sciences; some lased only at 2.5 or 2.6 mμ, but a few specimens exhibited stimulated emission simultaneously at 2.510 ± 0.005 and 2.605 ± 0.005 mμ.

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These are referred to as "mixed" crystals. In view of the desirability in some cases of having a laser with several wavelengths in the present work there were studied and compared the luminescence and stimulated emission spectra of the "mixed" crystals and, for comparison, of the "single-wavelength" crystals. The luminescence spectra were recorded under infrared flash tube excitation by means of a ZMR-3 mirror monochromator equipped with an InSb detector. The spectra were recorded at different temperatures in the range from 0 to -175°C. In the luminescence spectra of "mixed" crystals there appear lines at both 2.5 and 2.6 mμ; with decrease in temperature these become narrower, and the 2.6 mμ line become relatively more intense. The same two lines, exhibiting the same temperature behavior, were observed in the luminescence spectra of the "simple" crystals yielding stimulated emission only at 2.6 mμ. It is inferred from the behavior of the different crystals that the "mixed" crystals may be regarded as a mechanical mixture of two different forms of U^{3+} ions, with different symmetry, which emit independently of one another. This inference is supported by the results of measuring the temperature dependences of the lasing threshold for the "2.5 mμ", "2.6 mμ", and "mixed" crystals: the different types of U^{3+} ions (centers) act as independent sources of coherent radiation. During the preparation of the present report a paper by J. Wittke, Z.Kiss,

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R. Duncan, and J. McCormick (Proc.IEE,51,56,1963) appeared, reporting similar studies and some of the some inferences. Orig. art. has: 2 figures.

ASSOCIATION: none

SUBMITTED: 31May63 DATE ACQ: 02Apr64 ENCL: 00

SUB CODE: PH NR REF SOV: 002 OTHER: 004

Card 3/3

L 33976-65 EWT(1)/EEC(t)/T/EED(b)-2 Pl-4 IJP(c)
ACCESSION NR: AT4042137 S/2504/64/027/000/0111/0149

29
26
B+1

AUTHOR: Rakov, A. V.

TITLE: The study of molecular Brownian rotation of condensed substances using the methods of combination scattering and infrared absorption 21

SOURCE: AN SSSR. Fizicheskiy institut. Trudy, v. 27, 1964. Issledovaniya po molekulyarnoy spektroskopii (Research in molecular spectroscopy), 111-149

TOPIC TAGS: Brownian rotational motion, molecular motion, molecular potential barrier, molecular rotation frequency, viscosity effect, spectral line widening, molecular interaction, infrared absorption

ABSTRACT: The study of molecular Brownian rotation represents one of the numerous methods for the study of molecular interactions. Particularly large vistas for the study, by optical means, of the mechanism of orientational molecular motion in liquids were opened by a paper by I. I. Sobel'man (Izv. AN SSSR, seriya fizich., 17, 554, 1953), in which he studied the influence of random Brownian-type rotational motion of molecules on the width of spectral lines due to combination scattering. At the time of the start of this dissertation (1953 - submitted later to the Otdeleniye "Stroyeniye veshchestva" fizicheskogo fakul'teta Moskovskogo

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gosudarstvennogo universiteta im. M.V. Lomonosova (Structure of matter department of the Physics faculty of the Moscow state university)), there were no known experimental data which could confirm Sobel'man's conclusions. In addition, no one had ever tried to utilize the combination scattering and infrared absorption methods for the study of Brownian rotations of molecules. Consequently, the author proceeded to 1) study the temperature and phase dependence of the line width corresponding to different degrees of depolarization and band width; 2) develop a method for the determination of a mean molecular reorientation time; 3) explain the way by which the intermolecular interaction affects the rotational motion of the molecules; 4) clarify the character of molecular reorientations in crystalline substances; and 5) analyze the results obtained on the basis of ideas known in the scientific literature. The thesis describes the experimental part of the combination scattering study of Brownian rotational molecular motions in liquids, the rotational molecular motion in crystals, and the experimental study of the same effects using infrared absorption. The author finds that the mean molecular reorientation time in liquids is $(1\text{-}10)\cdot10^{-12}$ sec., which should be compared with the molecular oscillation period of $(1\text{-}2)\cdot10^{-13}$ sec. These results are in fair agreement with the theory of molecular motion (Ya. I. Frenkel', Sobraniye izbrannykh trudov (Collected Papers), vol. III, AN SSSR, 1950), according

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to which the molecules carry out oscillatory motion with respect to the "temporary" equilibrium position and go over into new equilibrium positions over periods of time which are significantly larger than the period of oscillation. Also, the line (band) width is inversely proportional to the coefficient of viscosity. The potential molecular reorientation barrier found by the author coincides exactly with the value of the potential barrier found during the determinations of the temperature dependence of the viscosity coefficient. Finally, the author notes that all the experimental data obtained in connection with the changes in line widths are in excellent agreement with the theory developed recently by K. A. Valiyev (see, e.g., ZhETF, 40, 1832, 1961; K. A. Valiyev, L. D. Eskin, Optika i spektroskopiya, 12, 758, 1962). "The author thanks his sponsor, Prof. Pavel Alekseyevich Bazhulin, for constant interest and help during the investigation. The tests of the device for photographic recording were carried out together with G. V. Mikhaylov." Orig. art. has: 34 formulas, 24 figures, and 11 tables.

ASSOCIATION: Fizicheskiy institut im. P. N. Lebedeva AN SSSR (Physics Institute, AN SSSR)

SUBMITTED: 00 ENCL: 00 SUB CODE: GP

NO REF SOV: 034 OTHER: 012

Card 3/3

SOV/51-7-2-9/34

AUTHOR: Rakov, A.V.

TITLE: The Effect of Intermolecular Interaction on the Width of Raman Spectral Lines in Liquids (Vliyaniye mezhmolekulyarnogo vzaimodeystviya na shirinu liniy spektrov kombinatsionnogo rasseyaniya v zhidkostyakh)

PERIODICAL: Optika i spektroskopiya, 1959, Vol 7, Nr 2, pp 202-207 (USSR)

ABSTRACT: It was shown earlier (Refs 3, 8) that the width of Raman lines of benzene and n-dichlorobenzene falls discontinuously on transition from liquid to crystal phase; the change was greatest in strongly depolarized lines (degree of depolarization $\rho \approx 6/7$). The present paper describes a study of the temperature dependences (between -180°C and +20°C) of the Raman line widths of substances which vitrify at low temperatures: 2-methylpentane (T_g = -155°C) and 2-methylhexane (T_g = -118°C). The results of measurements are shown in Fig 1: the line widths decrease smoothly with lowering of temperature and are practically temperature-independent in the vitrification region. As in the case of substances which crystallize, the greatest change in the widths is observed in strongly depolarized lines ($\rho \approx 6/7$). At high temperatures the widths of depolarized lines are higher than those of polarized lines. Similar

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The Effect of Intermolecular Interaction on the Width of Raman Spectral Lines in Liquids

observations were made by earlier workers (Refs 1, 2, 4). The temperature dependence of the Raman line widths can be used to determine the mean re-orientation time of a molecule in a liquid. For this purpose it is necessary to separate out the broadening due to rotational motion of the molecule in liquid from the total width of a depolarized line. This broadening is, in fact, equal to the difference between the Raman line widths in the liquid and solid phases (rotational motion does not occur in the latter). Table 1 gives the estimates of the mean re-orientation time of various molecules in liquid phase at 20°C. For 2-methylpentane this time is 3.5×10^{-12}sec and for 2-methylhexane it is 7.5×10^{-12}sec. The author studied also the Raman spectrum of ethyl alcohol. The temperature dependence of the Raman line widths of this alcohol (Fig 2) is the same as that of non-polar molecules. The mean re-orientation time of an ethyl alcohol molecule at 20°C was estimated to be 5×10^{-12}sec. Fig 3 shows the dependence of the width of depolarized Raman lines ($\rho \approx 6/7$) of 2-methylhexane, 2-methylpentane and benzene on $1/\eta$, where η is the viscosity of the solution. Within the experimental error the depolarized line width is a linear function of $1/\eta$. This

The Effect of Intermolecular Interaction on the Width of Raman Spectral Lines in Liquids

indicates that in the region 0.1-0.001 poises viscosity of homogeneous non-polar liquids is a linear function of the mean re-orientation time of the liquid molecules. The author found also that the potential barriers U in Frenkel's theory of viscosity (Refs 15, 16) are identical with the potential barriers U_1 in re-orientation of molecules in liquids (the U_1 values were deduced from the Raman line widths). Acknowledgments are made to Prof. P.A. Bazhulin who directed this work and to I.I. Sobel'man and A.I. Osipov for their advice. There are 3 figures, 3 tables and 16 references, 13 of which are Soviet, 1 translation into Russian and 2 English.

SUBMITTED: November 18, 1959

RAKOV, A.V., inzh.

Practices of the Leningrad Kirov Plant in using silicalcite in building apartment houses. Biul. tekh. inform. 4 no.3:4-7 Mr '58. (MIRA 11:3)
(Silicates) (Leningrad--Apartment houses)

RAKOV, A. V.

The relation of width of the combination line and the state of aggregation of substances. P. A. Bazhulin and A. V. Rakov. *Doklady Akad. Nauk S.S.S.R.* 105, 94-6 (1955). The widening of the combination dispersion lines was studied as a function of the rotational mol. motion during the liquid-solid conversion of benzene at 18° in the liquid phase, and at −5° in the solid, and of *p*-dichlorobenzene at 65° and at 20°. Conversion of the liquid to the cryst. state widened the lines considerably. The total widening is affected by depolarization. The line width is reduced to 0.2 to 0.33 of its value when depolarization has progressed to about 6/7 during the liquid → cryst. state, but the width of the polarized lines ($\rho = \ll 1$) changes only to 0.4 to 0.5 at the same conditions. W. M. Sternberg

Phys. Inst. im. Lebedev, AS USSR

L 64700-65 EWT(1)/EWT(m)/EPF(c)/EWP(j)/T IJP(c) RM

ACCESSION NR: AR5012270 UR/0058/65/000/003/D044/D044

37
B

SOURCE: Ref. zh. Fizika, Abs. 3D336

AUTHOR: Bazhulin, P. A.; Rakov, A. V.; Rakhimov, A. A.

TITLE: Investigation of the "low" frequency Raman spectrum of crystalline para-dichlorobenzene at various temperatures

CITED SOURCE: Tr. Komis. po spektroskopii. AN SSSR, vyp. 1, 1964, 280-287

TOPIC TAGS: Raman spectrum, organic crystal, spectrographic analysis

TRANSLATION: The "low frequency" spectrum of crystalline para-dichlorobenzene is studied in the 320-123°K range. The basic parameters of the spectrum are measured: frequencies, line widths and intensity ratios of the lines in the spectrum. The results are discussed.

ENCL: 00

SUB CODE: OP

Card 1/1

L 61687-65 EWT(l)/EPA(s)-2/EWT(m)/EWP(i)/EEC(t)/T/EWP(t)/EEC(b)-2/EWP(b)/EWA(h)
Pz-6/Pt-7/Peb/P1-4/P1-4 IJP(c) JD/GG/AT
ACCESSION NR: AP5011132 UR/0051/65/018/004/0717/0719
535.417

AUTHORS: Mal'kov, E. N.; Rakov, A. V.

TITLE: Interference method for the determination of the nucleation time of thin dielectric and semiconductor films and for the measurements of their thicknesses

SOURCE: Optika i spektroskopiya, v. 18, no. 4, 1965, 717-719

TOPIC TAGS: semiconductor film, thin film, dielectric film, nucleation time, film thickness, interference method

ABSTRACT: The authors have developed a method for the measurement of the nucleation time of a thin film, which is an important parameter describing the kinetics of the film formation. They have also developed a method for the measurement of film thickness considerably smaller than $\lambda/4n$ (λ -- wavelength, n -- refractive index). The methods are illustrated by Fig. 1 of the Enclosure and are based on the interference of light in thin films. It can be applied to dielectric and semiconducting layers obtained by

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ACCESSION NR: AP5011132

vacuum evaporation into a transparent substrate. The method is essentially based on simultaneously depositing a layer on the exposed substrate, on the substrate covered with a mask, and on a previously deposited layer on the same substrate. A spectrophotometer is used to observe the three interference patterns corresponding to the three different parts of the film in transmitted or reflected light. The measurement of the wavelengths and orders of the corresponding interference fringe maxima. The results of the measurements of the nucleation time of amorphous dielectric Sb_2S_3 films on a substrate with n = 1.5105 are presented as an example. The accuracy with which the nucleation time and the thickness can be determined is about 10 per cent. Original article has: 1 figure, 3 formulas, and 1 table

ASSOCIATION: None

SUBMITTED: 06Jul64 ENCL: 01 SUB CODE: OP, EC

NR REF SOV: 004 OTHER: 002

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L 61687-65

ACCESSION NR: AP5011132

ENCLOSURE: 01

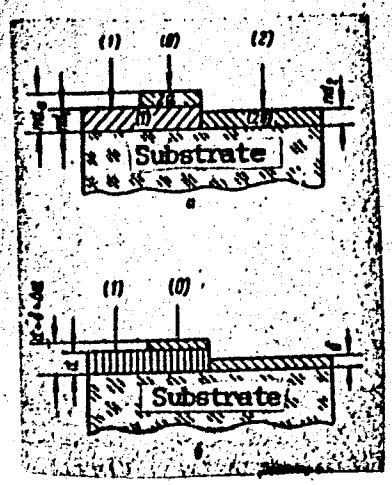

Fig. 1. Measurement of nucleation time of thin films and of their thickness.

a - section through the stepped film used to determine the nucleation time, b - film used to determine the thickness.

Card 3/3

RAKOV, A.V.

Temperature dependence of the line width of Raman spectra of substances in the crystalline state. Opt. i spektr. 10 no.6:713-716 Je '61. (MIRA 14:8)
(Electrons--Scattering) (Crystals--Spectra)

RAKOV, A.V.; BAZHULIN, P.A., doktor fiziko-matem. nauk, prof., nauchnyy rukovoditel' raboty

Study of the Brownian movement of molecules of condensed substances using the methods of Raman scattering and infrared absorption. (MIRA 17:9)
Trudy Fiz. inst. 27:111-149 '64.

RAKOV, Vitaliy Aleksandrovich; GOKHSHTEYN, B.Ya., kand. tekhn. nauk, retsenzent; KRYLOV, V.I., inzh., retsenzent; LOZANOVSKIY, A.L., inzh., retsenzent; NAKHODKIN, M.D., kand. tekhn. nauk, retsenzent; NEVEZHIN, P.P., inzh., retsenzent; TARASOV, G.F., inzh., retsenzent; TIKHMENEV, B.N., doktor tekhn. nauk, retsenzent; SAZONOV. I.A., inzh., retsenzent; SUKHODOL'SKIY, P.I., inzh., retsenzent; KRYLOV, S.K., inzh. red.; DANILOV, L.N., red. izd-va; SOKOLOVA, T.F., tekhn. red.

[A.C. electric locomotives] Elektrovozy peremennogo toka. Moskva, Gos. nauchno-tekhn. izd-vo mashinostroit. lit-ry, 1961. 531 p. (MIRA 14:10)

(Electric locomotives)

RAKOV, Anatoliy Vasil'yevich; BRILLIANTOV, L.N., inzh., red.; KUBNEVA, M.M., tekhn.red.

[Apartment houses built of silicalcite blocks; practices of the Kirov Plant in Leningrad] Zhilye doma iz silikal'tsita; opyt Kirovskogo zavoda v g.Leningrade. Leningrad. (Leningradskii dom nauchno-tekhnicheskoi propagandy. Obmen peredovym opytom. Seriia: Stroitel'naia promyshlennost', vyp.4). Pt.2. 1959. 7 p. (MIRA 13:4)

(Leningrad--Apartment houses) (Building materials)

Rakov, Beniamin Izrailevich

Indikatornyye ustroystva radiolokatsionnykh stantsiy. Leningrad, Sudpromgiz, 1962.

531 p. illus., diagrs.

Bibliography: p. 528-(529)

(Rakov)

RAKOV B M

Call Nr: Z695.92.R3

AUTHORS: Rakov, B.M., Cherenin, V.P.

TITLE: Experimental Machine For Information Retrieval of the Institute of Scientific Information, the Academy of Sciences, USSR (Eksperimental'naya informatsionnaya masnina Instituta nauchnoy informatsii AN SSSR).

PUB.DATA: Institut naucnnoy informatsii, AN SSSR, Moscow, 1955, 41 pp., 2,000 copies.

ORIG.AGENCY: AN SSSR. Institut naucnnoy informatsii.

EDITOR: None given.

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Call Nr: Z695.92.R3

Experimental Machine for Information (Cont.)

PURPOSE: To describe the experimental information retriever computer of the Institute of Scientific Information, Academy of Sciences, USSR.

COVERAGE: The EIM (Eksperimental'naya informatsionnaya mashina) experimental information retriever is an improved and modified version of the Model C80-1 sorting-computing machine. The modifications consist of changes in the memory system and in the data-sensing system, and also in the addition of an electronic circuit to permit an automatic retrieval of the desired information. Despite the simplicity, the machine is said to be capable of storing almost any language data and code, and is flexible enought to perform a variety of stored data searches. There are no personalities mentioned. The footnotes contain 2 USSR and 3 English references.

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Experimental Machine for Information (Cont.)

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Introduction		3-8
1.	Elements of information, characteristics, conditions of selection, serial computing machines	9-11
2.	Coding	12-17
3.	Example of a punched card dummy	18-28
4.	Principles of matching characteristics	29-35
5.	Recording and reading of information	36-38
6.	Description of the EIM	39-41

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30836

S/044/61/000/008/005/039
C111/C333

16.6800 (1121, 1327, 1399, 1024)

AUTHOR: Rakov, B. N.

TITLE: Logical synthesis of relay circuits with resistances and contacts

PERIODICAL: Referativnyy zhurnal, Matematika, no. 8, 1961, 44, abstract 8A287. ("Logicheskiye issledovaniya", M., AN SSSR, 1959, 429-441)

TEXT: The author describes a method for the construction of relay-contact (r.-c.) circuits from quadripoles of type Z_I and type Z_{II}. As a quadripole of type Z_{II} the author denotes a T-shaped quadripole, the series resistances of which Z_1 and Z_3 have finite constant values, while the leak resistance Z_2 is the resistance of a certain contact dipole which shunts the output of the quadripole over the resistance Z_3. A quadripole of type Z_I is a quadripole Z_{II} for which $Z_3 = 0$. To the conductance $Y_2 = 1/Z_2$ of the contact dipole of the quadripole Z_I or Z_{II} the Boolean variable f is assigned according to the following

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Logical synthesis of relay circuits ...

rule: f = 0 if $Y_2 = 0$ and f = 1 if $Y_2 = \infty$. The quadripoles Z_I and Z_{II}, at the outputs of which relays are connected, form so-called inverse r.-c. circuits - in their effect they are equivalent to an r.-c. circuits which is described by an expression $\bar{f} \cdot X$, where the point is the sign for the series connection of the relay X with the contact dipole $\bar{f}$ which is inverse to the contact dipole f. The cascade and parallel connection of n quadripoles Z_{II} are equivalent to the following r.-c. circuits of normal type: $\prod_{k=1}^{n} \bar{f}_k \cdot X$ and $\sum_{k=1}^{n} \bar{f}_k \cdot X$, where $\prod$ and $\sum$ are the symbols of the Boolean products and sums. The cascade and parallel connection of quadripoles have equal relay effect - both connections realize the Boolean product of the inversions $\bar{f}_k$ of the contact dipoles f_k, k = 1,2,...,n. The parallel connection of the quadripoles has the following property valuable for the diminution of the contact number: If the circuit contains a group of quadripoles

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Logical synthesis of relay circuits ...

Z_{IIi} for which $Z_{IIi} = Z_2$ for all i, then it can be replaced by a multipole, equivalent in its relay action, which possesses the same two input points, a dipole Z_1, a contact dipole Z_2 and so many dipoles Z_{3i} connected with the corresponding relays X_i as in the original circuit. Some examples are considered. They illustrate the possibility of reducing the number of contacts in circuits of decoders which are formed from r.-c. quadripoles of type Z_I and Z_{II}.

Note of the reviewer: 1) The left drawing in figure 1 shows a quadripole Z_{II}, the right one - Z_I. In order to eliminate the discrepancy between figure and text either the drawings of the quadripoles Z_I and Z_{II} or the letters b and a corresponding to them must be interchanged. 2) The symbols $|Y_1 f_i|$, $\doteq$, $f_i P_i$ and ■ ("symbol for series connection of sections of electric chains") used in several formulas, have no correct definition. Therefore, the formulas containing these symbols

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2836

S/044/61/000/008/005/059
C111/C333

Logical synthesis of relay ciruits ..

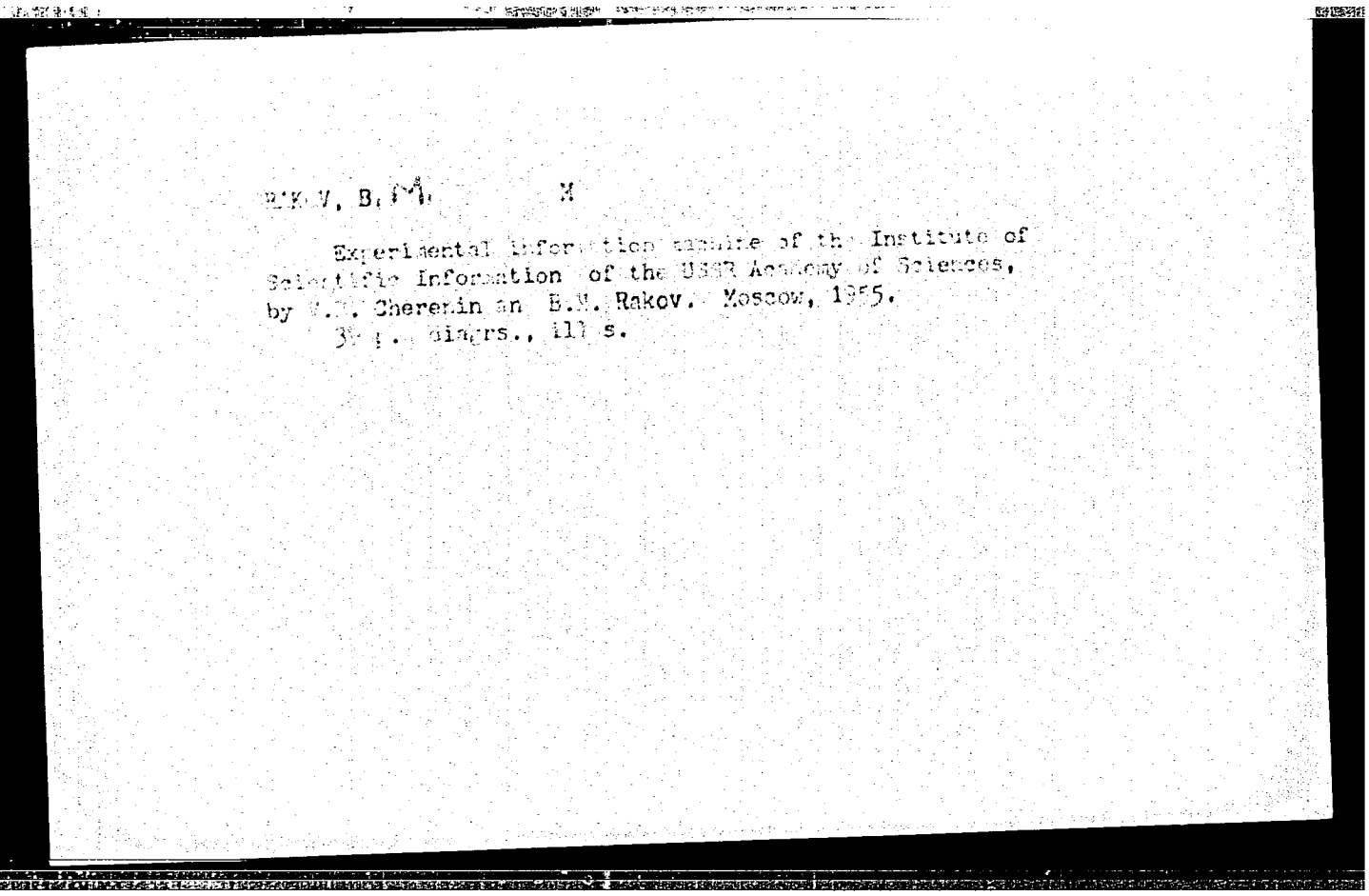
have no clear methematical sense.

[Abstracter's note: Complete translation.]

Card 4/4

MAKOV, E. M., [illegible]

Byulleten' YUNESKO dlya bibliotek; machines for Retrieving Information in the USSR. Unesco Library Bulletin, 11 /8-9/ 1957. Also published in English, French and Spanish; and in German in Nachrichten für Dokumentation 9/1/, 1958.



Experimental Information Bulletin of the Institute of Scientific Information of the USSR Academy of Sciences, by V.V. Cherenin and B.M. Rakov. Moscow, 1955.
3[illegible] p. diagrs., ill s.

RAKOV, D.

Pay more attention to the procurement of medical raw materials. (MIRA 14:2)
Apt. delo 10 no. 1:60 Ja-F '61.
(BOTANICAL DRUG INDUSTRY)

RODBERG, G.M., inzh.; RAKOV, E.D., inzh.

Introducing multiple machining of parts. Mashinostroenie no.3:7-10 My-Je '62. (MIRA 15:7)

1. Zavod "Odesspoligrafmash".
(Machine-shop practice)

SHUGAL, Ye.G.; RYABOY, O.M.; BOCHAROVA, T.V.; KISLYAK, L.M.,; KOBEL'KOVA, A.M.; LYKOV, A.D.; MANYAKHINA, O.V.; SHLENOVA, T.G.; YAGUPOVA, Ye.I.; IVANOV, N.A.; RYBKIN, I.P.; KHOKHLOVA, P.Ye.; KHRUNTYAYEVA, A.S.; FROLOVA, M.I.; RAKOV, F.M., red.; MARCHENKO, V.A., red.; KOLPAKOV, B.T., red.; DEMINA, V.N., red.; MELENT'YEV, A.M., tekhn. red.

[Soviet commerce of the R.S.F.S.R.; a statistical manual] Sovetskaia torgovlia v RSFSR; statisticheskii sbornik. Moskva, Gos. stat. izd-vo, 1956. 342 p. (MIRA 11:10)

1. Russia (1917- R.S.F.S.R.) TSentral'noye statisticheskoye upravleniye.
(Commercial statistics)

AREUZOV, A. IE: [illegible] (deceased)

Kazan' Tatar ASSR, -1941-

Deceased, c1941

Mbr, Sci Res Chem Inst im Butlerov, Kazan' State U, -1941.

"Dipole moments of esters of phosphoric, phosphorous, and phosphonic acids," IAN SSSR, Otdel Khim Nauk, No. 3, 1950. Submitted 12 July 1948.

[redacted]-W-13533 (in AREUZOV's folder)

ZEZIN, M.A.; RAKOV, I.D.; POPOV, N.T.

Automatic control for changing the direction of the flame in pot furnaces. Stek.i ker. 18 no.8:18-22 Ag '61. (MIRA 14:8)
(Automatic control) (Glass furnaces)

PSHENICHNYY, A.A., inzhener; RAKOV, I.L., inzhener.

Ventilationshaft sinking at the "Butovskaia-Glubokaia" mine. (MLRA 10:7)
Shakht.stroi. no.3:20-26 Mr '57.
(Donets Basin--Shaft sinking) (Mine ventilation)

DAVYDOV, M.P.; TYURKYAN, R.A.; RAKOV, I.L.

How 241 meters of completed shaft were sunk in one month.
Shakht.stroi. no.5:25-28 My '57. (MLRA 10:7)
(Shaft sinking)

RAKOV, I.M., kand.med.nauk

Mixed tumors of the palate [with summary in English]. Vest.oto-rin. 19 no.4:73-76 Jl-Ag '57. (MIRA 10:11)

1. Iz oto-laringologicheskogo otdeleniya mediko-sanitarnoy chasti Chelyabinskogo zavoda.
(PALATE, neoplasms
mixed tumors, clin. aspects, diag. & surg.)

RAKOV, I.M. (Kemerovo)

Intubation with a tracheobronchoscope prior to a tracheotomy for the compression an. displacement of the trachea during a pathological process. Zhur. ush., nos. i gor. bol. 24 no.2:66-68 Mr-Ap '64 (MIRA 18:1)

1. Iz kliniki bolezney ukha, gorla i nosa (zav. - kand. med. nauk I.M.Rakov) Kemerovskogo meditsinskogo instituta.

RAKOV, I. M.

37673 o pishchevodnykh svishchakh. vestnik otokinolakingologii 1949 No. 6, s. 53-57- bibliogk: 16 naxv.

So. Letopis' Zhurnal'nykh Statey, Vol. 47, 1949

KRAPIVIN, M.G., dotsent; MANAKOV, V.M., inzh.; NAKOV, I.Ya., inzh.

Investigating some parameters of multi-blade rotary cutters for rocks. Izv. vys. ucheb. zav.; gor. zhur. 7 no.11:87-93 '64. (MIRA 18:3)

1. Novocherkasskiy politekhnicheskiy institut. Rekomendovana kafedroy gornykh mashin.

RAKOV, K.A., inzh.; NECHAYEV, V.A., inzh.; PIGALEV, V.P., inzh.

Use of 300 atm. steam pressure and temperatures of 650 C in an experimental boiler of the all-Union Heat Engineering Institute. Elek.sta. 34 no.2:7-12 F '63. (MIRA 16:4)
(Boilers)

RAKOV, K. A. (Cand. Tech. Sci.)

"Development of the Thermo-technical bases of Super-high-output Boiler Sets for Super Critical Pressure."

report presented at a Conf. on New Types of Equipment for Unitptype Power Stations Employing Super-critical Steam Conditions, Power Inst, Acad. Sci. USSR, Moscow, 14-16 May 1958.
(brief account of report ~~xx~~ appears in Teploenergetika, 1958, No. 9, p. 92-95)

All-Union Thermo-Technical Inst.

AKAYUTIN, Stepan Aleksandrovich; KANAYEV, A.A., kandidat tekhnicheskikh nauk, retsenzent; [redacted] kandidat tekhnicheskikh nauk, retsenzent; KOMAROVRATOV, I.Ya., doktor tekhnicheskikh nauk, professor, redaktor; MODEL', B.I., tekhnicheskiy redaktor

[Outlook for the development of steam and gas turbines of electric power plants; thermodynamic, technical and economic studies] Perspektivy razvitiia parovykh i gazovykh turbin elektricheskikh stantsii; termodinamicheskie i tekhniko-ekonomicheskie issledovaniia. Moskva, Gos.nauchno-tekhn.izd-vo mashinostroit.lit-ry, 1957. 219 p. (MLRA 10:10)
(Turbines)
(Electric power plants)

RAKOV, K.A.

2741. INVESTIGATION OF THE OPERATION OF THE (EXPERIMENTAL) ONCE-THROUGH BOILER IN THE VTI HEAT-AND-POWER STATION AT SUPERCRITICAL AND SUPER-HIGH PRESSURES. Rakov, K.A. and Bulgakova, M.Y. (Teploenergetika (Heat Pwr Engng, Moscow), Apr. 1957, 21-28). Considerable data are given on temperature of heating surfaces and hydrodynamics at 180 to 300 atm at different loads. (L).

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MT

[illegible], Yu.M., kandidat tekhnicheskikh nauk; NOVI, Yu O., kandidat tekhnicheskikh nauk; RAKOV, K.A., kandidat tekhnicheskikh nauk; ALEKSEYEV, G.I., inzhener; BULGAKOVA, N.V., inzhener; TARATUTA, V.A., inzhener.

Results of thermochemical tests on a once-through boiler at 215 and 300 atm. Teploenergetika 3 no.8:10-13 Ag '56. (MIRA 9:10)

1.Vsesoyuznyy teplotekhnicheskiy institut imeni D.Yerzhinskogo i Moskovskoye otdeleniye TSentral'nogo kotloturbinnogo instituta.
(Boilers)

RAKOV, K. A., KROL, L. B., PANASENKO, M. D. (Masters of Science) andBULGAKOVA, N. V. Engr.

"Experimental Boiler Plant with 'Once Through' Boiler for Very High Steam Parameters (300 ata, 600° C)," paper presented at yhe 5th World Power Conference, Vienna, 1956

In Branch # 5

AID P - 4952

Subject : USSR/Engineering

Card 1/1 Pub. 110-a - 1/21

Authors : Rakov, K. A., L. B. Krol', I. B. Varavitskiy, V. M. Biman, Kandidats of Tech. Sci.

Title : Some problems of designing large once-through boilers of super-pressure type.

Periodical : Teploenergetika, 8, 3-10, Ag 1956

Abstract : The authors give recommendations for the design of the above boilers, based on tests with the experimental VTI boiler (up to 300 atmospheres and 600°C), as well as on the joint work of Organenergostroy and VTI Institutes in 1954-1955. The article is illustrated by 7 diagrams of boilers of supercritical pressure.

Institutions: All-Union Heat Engineering Institute (VTI) and All-Union Trust for the Construction of Power Plants (Organenergostroy).

Submitted : No date

AID P - 4953

Subject : USSR/Engineering

Card 1/ Pub. 110-a - 2/21

Authors : Kostrikin, Yu. M., Yu. O. Novi, K. A. Rakov, Kandidats of Tech. Sci., G. I. Aleynikov, N. V. Bulgakova, V. A. Taratuta, Engineers.

Title : Results of thermal and chemical tests of a once-through boiler of 215 and 300 atmospheres.

Periodical : Teploenergetika, 8, 10-13, Ag 1956

Abstract : Data are given on the quality of steam supplied by an once-through boiler operating at 215 and 300 atmospheres. The boiler is fed by the turbine condensate mixed with the cooling calcium-bicarbonate water. The design and performance of boilers of near critical and super critical pressures are discussed, and various related problems are examined. 4 diagrams. 3 references.

Teploenergetika, 8, 10-13, Ag 1956 AID P - 4953

Card 2/2 Pub. 110-a - 2/21

Institution : VTI (All-Union Heat Engineering Institute) and TsKTI (Central Institute for Boilers and Turbines), Moscow Branch.

Submitted : No date

DAVIDOV, A.A., inzhener; SHMUKLER, B.I., inzhener; ZHIVOTOV, A.P., inzhener; RAKOV, K.A., kandidat tekhnicheskikh nauk.

Dynamic characteristics of once-through-type boilers. (MLRA 9:12)
Teploenergetika 3 no.11:19-25 N '56.

1. Moskovskoye otdeleniye Kotloturbinnogo instituta i Vsesoyuznyy teploteknicheskiy institut imeni Dzerzhinskogo.
(Boilers)

AUTHORS: Rakov, K. A. (Cand. Tech. Sc.) and Bulgakova, N.V. (Eng.) (All-Union Thermotechnical Institute).

TITLE: Investigation of the working process of a uniflow boiler of the heat and electric power station of the All-Union Thermotechnical Institute with super-critical and super-high pressures. (Issledovaniye rabochego prosessa pryamotochnogo kotla TETs VTI pri sverkhkriticheskikh ei sverkhvysokikh davleniyakh).

PERIODICAL: "Teploenergetika" (Thermal Power), 1957, Vol.4, No.4, April, pp. 21-28 (U.S.S.R.)

ABSTRACT: Internal processes in uniflow boilers operating under super-critical conditions display a number of special features due to the physical properties of water and steam. At a pressure of 300 atm. and a steam temperature of 600°C the specific volume of the working fluid only increases by a factor of ten in the boiler. Because the medium is in a single phase there is no zone of evaporation and the specific heat of the medium is greater than when conditions are sub-critical. Therefore, in boilers operating at super-critical pressure there are no pulsations of output at the coils. Measurements were made of the temperature, pressure and specific heat of the medium in the experimental boiler of the Thermotechnical Institute. Measurements were also made of the thermal loading of the surfaces and of the metal temperature and the hydrodynamics of the medium were

Investigation of the working process of a uniflow boiler of the heat and electric power station of the All-Union Thermotechnical Institute with super-critical and super-high pressures. (Cont.)

investigated in particular parts of the boiler. The distribution of heat absorption between different parts of the boiler was investigated when burning fuel oil and coal dust. The results are presented in the form of graphs for different rates of steaming. When burning fuel-oil, 65 to 70% of the heat is applied to the radiation economiser, this proportion drops to 35 to 40% when coal dust is burned and that of the radiation super-heater increases to 28-33%. The heat transfer of the convective super-heater increases from 6 to 12% when burning fuel oil to 20 to 28% when burning dust. With constant feed water temperature (100°C) and super-heated steam temperature (600°C) intermediate temperatures in the boiler change markedly with change of load because of the increase in the quantity of heat transmitted by radiation in the furnace when the load is reduced. With rapid changes in load there are corresponding changes in the weight of substance within the boiler which leads to the boiler coils being filled with excess of steam or feed water so that even when the delivery of feed water is synchronised with the offtake of steam there are variations in temperature. Displacement of the point of phase transfer is most marked when the proportion of

Investigation of the working process of a uniflow boiler of the heat and electric power station of the All-Union Thermotechnical Institute with super-critical and super-high pressures. (Cont.)

heat transmission in the radiation economiser is high. This is partly due to the characteristics of the boiler used, in industrial boilers for super-critical pressure with a feed water temperature of 275-300°C heat transfer in the radiation economiser will apparently not exceed 20% and, therefore, the displacement of the point of phase transfer will be relatively small. An essential question for the reliable operation of uniflow boilers is to ensure that variations of temperature in the coils caused by unequal heating and non-uniform distribution of the medium are small. These temperature variations must be less at super-critical than at sub-critical pressures. This question was investigated and the results are presented in the form of graphs. In the period immediately before running the experimental boiler at a pressure of 300 atm. the possibility was suggested that there might be considerable deterioration in the heat transfer at super-critical pressure. It was, therefore, of interest to determine the external temperatures of the metal of the heating surface in the region of phase transfer. Altogether 53 series of

Investigation of the working process of a uniflow boiler of the heat and electric power station of the All-Union Thermotechnical Institute with super-critical and super-high pressures. (Cont.)

measurements were made at pressures from 180 to 300 atm, super-heat temperatures of 540-600°C and loads of 6 to 12 tons/hour. The results are presented in the form of graphs and are discussed. The main conclusion is that the measurements of metal temperature show that heat transfer in the boiler is good enough and that the selected brands of steel operate within permitted temperature limits. The hydro-dynamics of the experimental boiler were investigated. Determinations were made of the rate of flow of the medium in the tube of the upper radiation section and of the transitional zone. At sub-critical pressures these parts of the boiler work wholly or partially on a steam water mixture. The results are presented in the form of graphs. There were no pulsations of flow in any part of the boiler over the pressure range of 180 to 300 atm. with either constant or variable load or during starting or stopping of the boiler. The non-uniformity of distribution of water between tubes of the radiation economiser was from 4 to 18% when burning fuel oil. The water distribution in the upper radiation section improved with reduction in the load and the uniformity was then better. This improvement

Investigation of the working process of a uniflow boiler of the heat and electric power station of the All-Union Thermotechnical Institute with super-critical and super-high pressures. (Cont.)

was caused by considerable increase in the mean specific volumes in the coils of the upper radiation parts with reduction in load and increase in the resistance of the tubes relative to the collectors. The hydraulic resistance of the boiler was quite small when burning coal but somewhat greater when burning oil because the point of phase transfer was displaced. The water flow through a single coil of diameter 32 x 6 mm was 1000 to 1200 kg/hour. In large boilers when the flow through such a coil is 2 to 3 tons/hour the resistance of the boiler should increase to 30 to 40 atm. With increase in load the increase in boiler resistance was almost linear. The resistance of the economiser and the upper radiation part was practically independent of pressure, the resistance of the transitional zone increased with pressure. The experiments on the experimental uniflow boiler showed that uniflow boilers at super-critical pressure are most reliable steam generators. They are more reliable than uniflow boilers working at lower pressures since they work on a single phase medium free from pulsation, stratification and non-uniform distribution of a two-phase medium. With

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Investigation of the working process of a uniflow boiler of the heat and electric power station of the All-Union Thermotechnical Institute with super-critical and super-high pressures. (Cont.)

identical super-heat temperatures the operating temperatures of the metal in them are closer to the mean designed temperature because of improved heat transmission and smaller temperature variations which improves the operating conditions of the metal.
14 figures, no literature references.

RAKOV, K. A. VTI

"Thermo-technical Fundamentals of the Profile of Super-powerful Boiler Units Operating at Super-critical Pressures."

The Commission for High-parameter Steam of the Energeticheskiy institut (Power Institute) imeni G. M. Krzhizhanovskogo AN SSSR held a conference on May 16, 1958 devoted to new types of equipment for block-assembled power stations, operating at super-critical steam parameters. This paper was read at this conference.

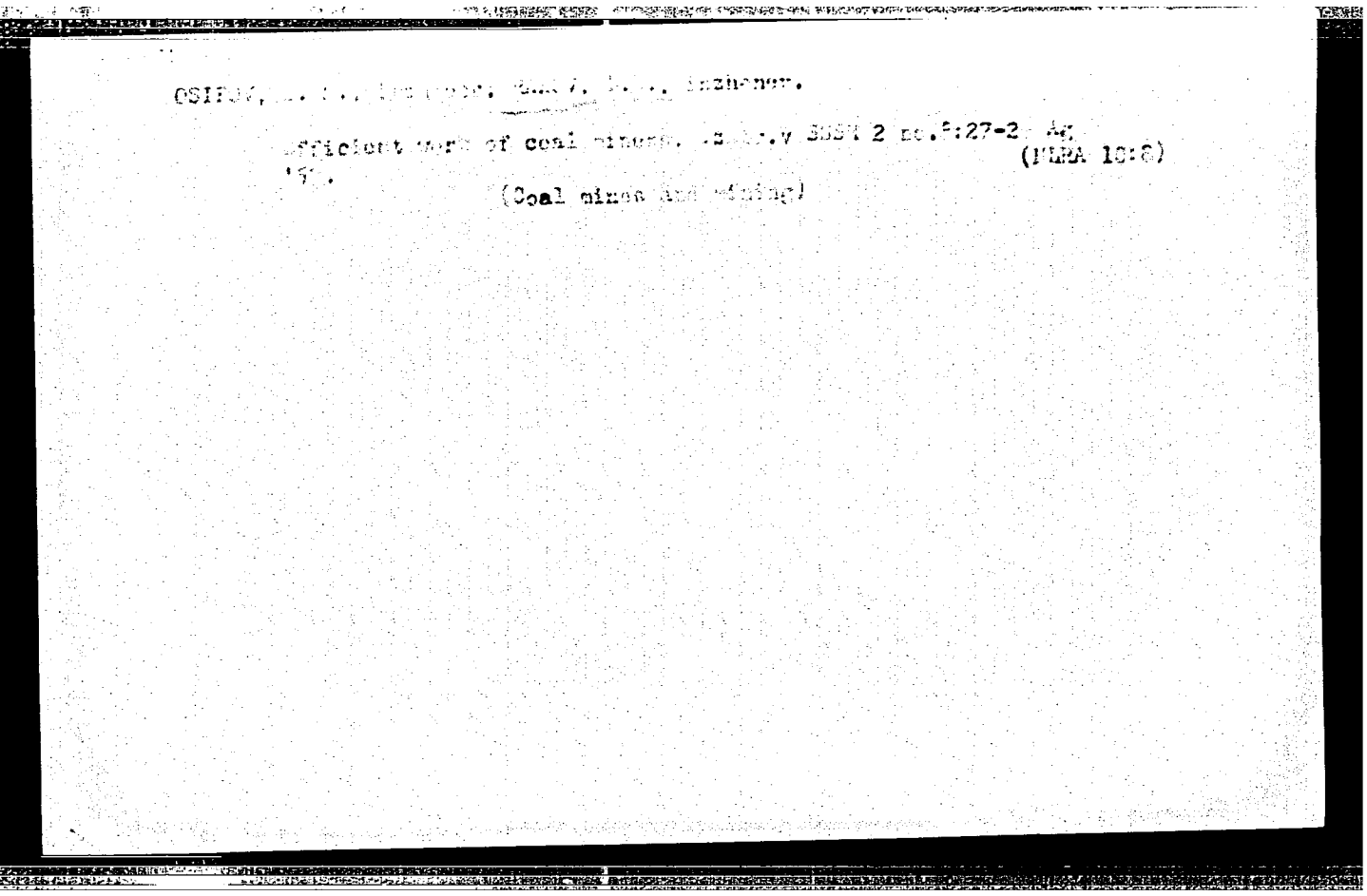
Izv. Akad Nauk SSSR, Otdel Tekh nauk, 1958, No. 7, p. 152

RAKOV, K.A., kand.tekhn.nauk

A 600 Mw. block of the Tanners Creek Electric Power Plant.
Teploenergetika 9 no.12:73 D '62. (MIRA 16:1)
(United States—Electric power plants)

RAKOV, K.A.

4/56. DYNAMIC CHARACTERISTICS OF ONCE-THROUGH BOILERS. Gerliker, A.A., Shnukler, B.I., Zhivotov, I.P. and Rakov, K.A. (Teploenergetika (Heat Pwr Engng, Moscow), Nov. 1956, vol. 3, 19-25). On the basis of experimental investigation a semi-empirical method is formulated for rating the dynamic characteristics of the steam temperature of once-through boilers in any section of the superheat path. (6). C.Abs.



OSIEJV, ... Inventor. ... Engineer.

...ficient work of coal mines. ... SUSR 2 no.5:27-2 Ag (MIRA 15:8)

(Coal mines and mining)

SOV/96-59-5-4/19

AUTHOR: Rakov, K.A., Candidate of Technical Sciences

TITLE: The Use of Super-Critical Steam Conditions in Heat and Electric Power Stations (District-Heating Power Stations) (Primeneniye para sverkhkriticheskikh parametrov na teploelektrotsentralyakh)

PERIODICAL: Teploenergetika, 1959, Nr 5, pp 22-28 (USSR)

ABSTRACT: At present, the construction of heat and electric power stations for district heating is lagging behind the rate of housing construction. The use of high steam conditions in heat and electric power stations, including super-critical conditions, is particularly neglected. Gas is now becoming more widely used in towns and, as water-heating boilers are much more efficient when gas-fired - suggestions have been made that further development of the combined generation of heat and power is unnecessary. Such suggestions are in fact ill-founded. In view of the increased housing construction, heat supply from power stations may be made more efficient by increasing the unit size of turbines, increasing the steam conditions to super-critical, reducing the pass-out steam conditions and making the district-heating networks themselves more

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The Use of Super-Critical Steam Conditions in Heat and Electric Power Stations

cheaply. Table 1 gives the results of approximate calculations to determine the economy resulting from the combined generation of heat and power compared with separate production. Comparisons made for various steam conditions clearly show the great advantage of using super-critical steam conditions. In Table 2, a comparison is made between the total heat consumption in heat and electric power stations and regional condensing stations when using the various steam conditions already mentioned and a back-pressure of 2 atm. The economies that result from constructing large combined heat and power stations are very considerable. The advantages of using superposed high-pressure sets to extend existing low-pressure heat and electric power stations are discussed. By using super-critical steam conditions in the superposed sets, it is possible to obtain additional power for heat consumption of 500 to 900 kcal/kWh, depending on the efficiency of the old boilers which are replaced. When superposed sets are installed in heat and electric power stations the old

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boilers may be used to cover water-heating peaks but apart from this the existing heat supply cannot be extended. Therefore, when superposing on heat and electric power stations, it is best also to extend the range of low-pressure turbines delivering steam for process and heating requirements. New boilers for super-critical steam conditions use feed-water at a temperature of 275-300°C, which is higher than the temperature of the feed-water returned from the low-pressure turbines. Steam has to be taken from the superposed turbine to heat the feed-water and also to supply turbines driving the feed pumps. Hence the amount of steam passed through the superposed turbine is 35-40% more than would be required for the low-pressure turbines alone. A schematic diagram showing the way in which the low-pressure drum-type boilers are used to handle the heating-system water is given in Fig 3. When heating water instead of raising steam, the throughput must be raised by a factor of about 20; in order to reduce the mechanical resistance it is arranged that most of the water bypasses the economisers.

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A schematic diagram of superposed plant in a station that already operates at two different pressures of 30 and 100 atm is given in Fig 4, with particulars. Moscow Heat and Electric Power Stations working with steam conditions of 100 atm and 500°C can only be superposed with sets of super-critical conditions. The best type of set to use in these circumstances is discussed. When super-high-pressures are introduced into a station the feed-water quality requirements become more stringent and special attention must be paid to the condition of the condensers in the low-pressure turbines. A number of cases of the use of superposition of new sets on existing stations is considered. It is sometimes thought that although the use of superposition results in considerable fuel economy, the capital cost per kilowatt is excessive. This false conclusion mainly results from incorrect methods of calculating capital costs. The correct way is to include not only the cost of the actual station but also

 the cost of the new mines and means for transporting fuel,

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which may considerably exceed the actual cost of the power station. Table 3 gives costs for a station operating with steam conditions of 300 atm and 650°C in sets of 300 MW; the cost of the mines and of the means of transport for different kinds of fuel are itemised. For the case of Moscow Basin coal the cost of the mines and the transport facilities is twice that of the station. When higher and more economic steam conditions are used the capital cost of the station itself increases but the cost of providing fuel and transport is reduced. This question is considered in more detail in relation to particular examples; citing Table 3 for the costs of power stations in different places running on different kinds of fuel. In most of the cases considered, the reduction in capital costs for mines and transport more than compensates for the extra capital cost of using high steam conditions. Super-position is found to be disadvantageous only when gas fuel is used near to the fields or when cheap Siberian coal is burned near the mines. These data relate to condensing stations but the

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conditions for district-heating stations are more favourable because of the greater fuel economy. It is accordingly recommended to extend existing heat and electric power stations by superposition and, in constructing new heat and electric power stations, to use steam conditions of 300 atm and 650°C with single-shaft heat-supply turbines of 200 MW. There are 4 figures, 3 tables and 3 Soviet references.

ASSOCIATION: Vsesoyuznyy Teplotekhnicheskiy Institut (All-Union Thermo-Technical Institute)

BULGAKOVA, N.V., inzh.; DEYEVA, Z.V., inzh.; KOT, A.A, kand.tekhn.nauk; RAKOV, K.A. kand.tekhn.nauk

Using chemically desalted feed water in high-pressure and super-pressure once-through boilers. Elek.sta. 29 no.3:8-12 Mr '58. (MIRA 11:5)
(Feed water)

RAKOV, K.A., kandidat tekhnicheskikh nauk; BULGAKOVA, N.V., inzhener .

Results obtained from the VII experimental continuous-operation boiler at 300 atm.and 600°C. Teploenergetika 4 no.3:22-26 Mr '57. (MLRA 10:3)

1. Vsesoyuznyy teplotekhnicheskiy institut.
(Boilers)

RAKOV, K.A.

4747. SOME PROBLEMS IN THE PLANNING OF LARGE ONCE-THROUGH BOILERS FOR SUPERCRITICAL STEAM CONDITIONS. Rakov, K.A., Krol, L.B., Varavitskii, I.B. and Bican, V.M. (Teploenergetika (Heat Pwr Engng, Moscow), Aug. 1956, 3-10). By 1960 the U.S.S.R. is to produce boiler-turbine units of 300 MW with steam at 300 atm and 650°C. Since 1949 VTI (the All-Union Heat Engineering Institute) has been running a small experimental once-through boiler at 300 atm and 600°C and in conjunction with the Orgenergostroi (Organization for Power Construction) Institute it has now worked out a project for a large once-through boiler giving 640 tons of steam an hour at 230 atm and 610°C. The following problems arising in this work are discussed: deposition and carryover of salts from the boiler and location of the zone of phase transition; the hydrodynamics of the boiler and the screening of the radiation portion; temperatures in the various parts of the boiler and metal temperature; reheat; feed water temperature and means of lowering flue gas temperature. (L).

RAKOV, K.A., kandidat tekhnicheskikh nauk; BULGAKOVA, N.V., inzhener.

Study of the working process in a uniflow boiler of a V.T.I. power station at supercritical and superhigh pressures. (MLRA 10:5)
Teploenergetika 4 no.4:21-28 Ap '57.

1. Vsesoyuznyy teplotekhnicheskiy institut.
(Boilers)

RAKOV, K. A., Cand. Tech. Sci.; BULGAKOV, N. V., Cand. Tech. Sci., Jr. sci. assoc.;
KROLYA, L. B., Cand. Tech. Sci.; PANASENKO, Cand. Tech. Sci.

"Schaffung, Entwicklung und Untersuchung einer mit überkritischem Druck (300 ata) bei einer Dampf-temperatur von 600° C arbeitenden Zwangdurchlaufkessel-Versuchsanlage," List of General Reports and Papers presented at the Fifth World Power Conference, Vienna, 10 January 1956, pg. 28.

E-2298

ANDREYEV, A.B.; ANTONOV, A.I.; ARAPOV, P.P., BARMASH, A.I., BEDNYAKOVA, A.B.; BENIN, G.S.; BERESNEVICH, V.V.; BERNSHTEYN, S.A.; BITYUTSKOV, V.I.; BLYUMENBERG, V.V.; BONCH-BRUYEVICH, M.D.; BORMOTOV, A.D.; BULGAKOV, N.I.; VEKSLER, B.A.; GAVRILENKO, I.V.; GENDLER, Ye.S., [deceased]; GERLIVANOV, N.A., [deceased]; GIBSHMAN, Ye.Ye.; GOLDOVSKIY, Ye.M.; GORBUNOV, P.P.; GORYALOV, F.A.; GRINBERG, B.G.; GRYUNER, V.S.; DANOVSKIY, N.F.; DZEVUL'SKIY, V.M., [deceased]; DREMAYLO, P.G.; DYBETS, S.G.; D'YACHENKO, P.F.; DYURMBAUM, N.S., [deceased]; YEGORCHENKO, B.F. [deceased]; YEL'YASHKEVICH, S.A.; ZHEREBOV, L.P.; ZAVEL'SKIY, A.S.; ZAVEL'SKIY, F.S.; IVANOVSKIY, S.R.; ITKIN, I.M.; KAZHDAN, A.Ya.; KAZHINSKIY, B.B.; KAPLINSKIY, S.V.; KASATKIN, F.S.; KATSAUROV, I.N.; KITAYGORODSKIY, I.I.; KOLESNIKOV, I.F.; KOLOSOV, V.A.; KOMAROV, N.S.; KOTOV, B.I.; LINDE, V.V.; LEBEDEV, N.V.; LEVITSKIY, N.I.; LOKSHIN, Ya.Yu; LUTTSAU, V.K.; MANNERBERGER, A.A.; MIKHAYLOV, V.A.; MIKHAYLOV, N.M.; MURAV'YEV, I.M.; NYDEL'MAN, G.E.; PAVLYSHKOV, L.S.; POLUYANOV, V.A.; POLYAKOV, Ye.S.; POPOV, V.V.; POPOV, N.I.; RAKHLIN, I.Ye., RZHEVSKIY, V.V.; ROZENBERG, G.V.; ROZENTRETER, B.A.; ROKOTYAN, Ye.S.; RUKAVISHNIKOV, V.I.; RUTOVSKIY, B.N. [deceased]; RYVKIN, P.M.; SMIRNOV, A.P.; STEPANOV, G.Yu, STEPANOV, Yu.A.; TARASOV, L.Ya.; TOKAREV, L.I.; USPASSKIY, P.P.; FEDOROV, A.V.; FERE, N.E.; FRENKEL', N.Z.; KHEYFETS, S.Ya.; KHLOPIN, M.I.; KHODOT, V.V.; SHAMSHUR, V.I.; SHAPIRO, A.Ye.; SHATSOV, N.I.; SHISHKINA, N.N.; SHOR, E.R.; SHPICHENETSKIY, Ye.S.; SHPRINK, B.E.; SHTERLING, S.Z.; SHUTYY, L.R.; SHUKHGAL'TER, L. Ya.; EHVAYS, A.V.;

(Continued on next card)

ANDREYEV, A.B. (continued) .... Card 2.

YAKOVLEV, A.V.; ANDREYEV, Ye.S., retsenzent, redaktor; BERKEN-GEYM, B.M., retsenzent, redaktor; BERMAN, L.D., retsenzent, redaktor; BOLTINSKIY, V.N., retsenzent, redaktor; BONCH-BRUYEVICH, V.L., retsenzent, redaktor; VELLER, M.A., retsenzent, redaktor; VINOGRADOV, A.V., retsenzent, redaktor; GUDTSOV, N.T., retsenzent, redaktor; DEGTYAREV, I.L., retsenzent, redaktor; DEM'YANYUK, F.S., retsenzent; redaktor; DOBROSMYSLOV, I.N., retsenzent, redaktor; YELANCHIK G.M. retsenzent, redaktor; ZHEMOCHKIN, D.N., retsenzent, redaktor; SHURAVCHENKO, A.N., retsenzent, redaktor; ZLODEYEV, G.A., retsenzent, redaktor; KAPLUNOV, R.P., retsenzent, redaktor; KUSAKOV, M.M., retsenzent, redaktor; LEVINSON, L.Ye., [deceased] retsenzent, redaktor; MALOV, N.N., retsenzent, redaktor; MARKUS, V.A. retsenzent, redaktor; METELITSYN, I.I., retsenzent, redaktor; MIKHAYLOV, S.M., retsenzent; redaktor; OLIVETSKIY, B.A., retsenzent, redaktor; PAVLOV, B.A., retsenzent, redaktor; PANYUKOV, M.P., retsenzent, redaktor; PLAKSIN, I.N., retsenzent, redaktor; RAKOV, K.A., retsenzent, redaktor; RZHAVINSKIY, V.V., retsenzent, redaktor; RINBERG, A.M., retsenzent; redaktor; ROGOVIN, N. Ye., retsenzent, redaktor; RUDENKO, K.G., retsenzent, redaktor; RUTOVSKIY, B.N., [deceased] retsenzent, redaktor; RYZHOV, P.A., retsenzent, redaktor; SAMDOMIRSKIY, V.B., retsenzent, redaktor; SKHAMTAYEV, B.G., retsenzent, redaktor; SOKOV, V.S., retsenzent, redaktor; SOKOLOV, N.S., retsenzent, redaktor; SPIVAKOVSKIY, A.O., retsenzent, redaktor; STRAMENTOV, A.Ye., retsenzent, redaktor; STRELETSKIY, N.S., retsenzent, redaktor;

(Continued on next card)

ANDREYEV, A.V.,(continued) .... Card 3.

TRET'YAKOV, A.P., retsenzent, redaktor; FAYERMAN, Ye.M., retsenzent, redaktor; KHACHATYROV, T.S., retsenzent, redaktor; CHERNOV, H.V., retsenzent, redaktor; SHERGIN, A.P., retsenzent, redaktor; SHESTOPAL, V.M., retsenzent, redaktor; SHESHKO, Ye.F., retsenzent, redaktor; SHCHAPOV, N.M., retsenzent, redaktor; YAKOBSON, M.O., retsenzent, redaktor; STEPANOV, Yu.A., Professor, redaktor; DEM'YANYUK, F.S., professor, redaktor; ZNAMENSKIY, A.A., inzhener, redaktor; PLAKSIN, I.N., redaktor; RUTOVSKIY, B.N. [deceased] doktor khimicheskikh nauk, professor, redaktor; SHUKHGAL'TER, L. Ya, kandidat tekhnicheskikh nauk, dotsent, redaktor; BRESTINA, B.S., redaktor; ZNAMENSKIY, A.A., redaktor.

(Continued on next card)

ANDREYEV, A.V. (continued) .... Card 4.

[Concise polytechnical dictionary] Kratkii politekhnicheskii slovar'. Redaktsionnyi sovet; IU.A.Stepanov i dr. Moskva, Gos. izd-vo tekhniko-teoret. lit-ry, 1955. 1136 p. (MLRA 8:12)

1. Chlen-korrespondent AN SSSR (for Plaksin)
(Technology--Dictionaries)

RAKOV, K. A.

Electrical Engineering Abst.
Vol. 57 No. 675
Mar. 1954
Electrical Engineering

621.311.22

660. **Application of superstructures in expansion of existing power stations.** K. A. RAKOV. *Elekt. Stantsii*, 1953, *No.* 9, 13–20. *In Russian.*

Change of boilers and turbines to high pressure (250 atm. 550–600°c) and adding of regenerative water heating (260–280°c) may result in power output increase of existing power stations by 70–80%. Additional power is so obtainable in power-stations with minimum heat consumption 600–1000 kcal/kWh. To decrease the number of new turbines their rating should be increased to 100 MW. It is necessary to design boilers for 250 atm. 600°c producing 120, 240, 480 tons/hr. These will require corresponding piston pumps, which may also increase the efficiency of the power station by 1% and ensure better regulation of boilers. Use of intermediate steam heating may increase efficiency by 1·5–2%. J. ŁUKASZEWICZ

RAKOV, K.A., kandidat tekhnicheskikh nauk; KROL', L.B., kandidat tekhnicheskikh nauk; VARAVITSKIY, I.B., kandidat tekhnicheskikh nauk; BIMAN, V.M., kandidat tekhnicheskikh nauk.

Problems in designing large once-through boilers for supercritical steam parameters. Teploenergetika 5 no.8:3-10 Ag '56. (MLRA 9:10)

1.Vsesoyuznyy teplotekhnicheskiy institut i Orgenergostroy.
(Boilers)

RAKOV, K.A., kandidat tekhnicheskikh nauk.

Use of superstructures in expanding existing electric power plants. Elek. sta. 24 no.9:13-20 S '53. (MLRA 6:8)
(Electric power plants)

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608. HIGH PRESSURE EXTENSION OF EXISTING POWER STATIONS. Rakov, K.A. (Elek. Sta. (Par Sta., Moscow, Sept. 1953, vol. 24, 13-40). The article discusses features of power station extension by superimposing turbines at supercritical pressure (350 atm., 650-700°C), using auxiliary regenerative preheat of water up to 260-280°C, rendering possible an increase of 70-80% in station capacity. To keep down the number of topping turbines their capacity should be increased to 100 MW. The employment of intermediate steam superheating increases station efficiency by 1.5-2% as compared with conventional superheating. B.E.A.

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AUTHORS: Biman, V.M., Engineer and Rakov, E.A., Candidate of Technical Sciences

TITLE: Boiler Arrangements for 300 MW Sets with Steam Conditions of 300 atm 650°C (O profile kotla dlya bloka moshchnost'yu 300 Mvt na parametry para 300 ata, 650°C)

PERIODICAL: Teploenergetika, 1959, Nr 7, pp 46-55 (USSR)

ABSTRACT: This article describes eight different arrangements of a boiler with an output of 830 tons per hour. The steam conditions are 310 atm 655°C with one reheat at 60 atm from 420 to 570°C and a second one at 14 atm from 370 to 570°C; the feed water temperature is 275°C. The general conclusions are that new arrangements will be required for boilers of this output. The inverted-U arrangement that has been common hitherto does not look very promising and furnaces with burners at the top appear to have advantages. Higher boiler outputs will necessitate screens heated from both sides, in order to keep the boiler size down. Verticular tube arrangements are more convenient than horizontal to erect. In 1956-57 the All-Union Thermo-

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Technical Institute and Orgenergostroy compared a number of draft designs for a boiler with an output of 830 tons per hour burning Moscow Basin Coal. Some of the findings are applicable to other types of fuel, but not all. The fundamental requirements are the same as for smaller boilers but they are more severe; for example, greater reliability and longer operating periods. Accordingly, when burning solid fuel the gas temperature before the super-heater should not exceed 950 - 1050°C, and moderate gas tubes operating in parallel must be heated as uniformly as possible. The feed-water for once-through boilers must be specially pure. When super-critical pressure is used the feed-water may be regeneratively heated to a temperature of 275 - 330°C. This makes the cycle more efficient, but aggravates the problem of cooling the flue gases sufficiently. At super-critical pressures the medium is at a higher temperature, which complicates design, but the specific volume of steam is smaller. Hence for a given internal resistance, the tube diameter, and consequently the tube wall thickness, may be reduced. Therefore, the total weight of metal per

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kilowatt-hour output may actually be smaller in the boiler at super-critical pressure than in a normal high-pressure boiler, though, of course, the metal used will be more expensive. The high temperature of the feed-water leaving the ecomonisers necessitates air-heaters of very large size, to reduce the flue gas temperature sufficiently. It accordingly becomes important to design new types of compact and light air-heaters not subject to corrosion. A temperature-enthalpy diagram for a once-through boiler is given in Figure 1. The 'phase-conversion' temperature, or the point at which the specific heat of the water is greatest, is about 400°C at 300 atm. During regeneration of steam at 300 atm, 40% of the heat should be delivered to the medium in the liquid phase and 60% to the super-heated steam. The problem in arranging the radiant surfaces in the furnace is primarily to distribute the total radiative

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heat output between the radiation surfaces of the economiser, the 300 atm super-heater and the re-heaters. In a double reheat cycle about 20% of all the heat is used for reheat and it becomes impossible to locate both re-heaters in the convective gas way together with the economiser, the transitional zone and the convective super-heaters. Hence it is best to use radiant super-heaters for the 60 atm reheat and convective ones for the 14 atm. Accordingly, the convective part of the furnace contained the convective 300 atm super-heater, the convective 14 atm re-heater, the transitional zone, the second-stage air-heater, the convective economiser and the first stage air-heater. The curve of v = f (i) given in figure 1 illustrates the smooth increase in specific volume of the medium during the process of steam generation. An enthalpy-temperature diagram for the flue gases is given in figure 2 for one of the variants of boiler considered. With the existing procedure for calculating radiant heating surfaces it is not possible to make separate calculations for

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parts of the furnace. In the absence of adequate experimental data it was necessary to use rather arbitrary factors for the effectiveness of various radiant heating surfaces; the factors are given in Table 1. The use of super-critical pressures leads to alterations in the design of furnaces and in the arrangement of radiant heating surfaces. With boiler outputs greater than 400 tons per hour, it is necessary to use screens, heated from both sides, which divide the furnace from top to bottom into two or even three chambers. For outputs of 1 000 tons per hour and more, the excessive height of the boiler may require the use of additional screens arranged perpendicular to its axis. In the ultimate the furnace may be divided into a number of small chambers, as in the early Ramzin boilers. The advantages and disadvantages of this arrangement are discussed. Sufficient data is not yet available to permit judgement of the minimum size of such chambers when burning dry Moscow Basin coal. Schematic diagrams of eight different boiler arrangements are shown in Figure 3. Variants 1, 2 and 3 use a furnace with burners

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at the top and two screens heated from both sides; variants 4 and 7 have the burners at the top but use longitudinal and transverse screens; variant 6 is a two-way furnace with the burners at the top; variant 8 is a vertical tower arrangement; and variant 5 is a modification of the usual inverted-U arrangement. It will be seen that full consideration is given to the use of burners on the top of the furnace, with fuel bunkers arranged above the burners. This arrangement improves the furnace process as compared with the usual inverted-U arrangement. In addition, the steam pipes between the boiler and turbine may be made shorter. The great height of the two-stage tubular air-heater makes it difficult to produce a compact design, but a single-stage heater may be adequate when burning dry Moscow coal. Hitherto, most Soviet boilers have used the inverted-U arrangement with the forced-draught equipment located at datum level and with the boiler front facing the turbine room. This arrangement is a good one with existing outputs but becomes less con-

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venient as the output rises, particularly when the boiler/turbine unit system is used. With once-through boilers there is greater freedom to depart from the inverted-U arrangement in which an attempt has been made to reduce the length of the pulverised-fuel lines is illustrated in Figure 5 and described in the text. A two-way furnace with burners at the top, variant 6, is illustrated in Figure 6 and described. The design seeks to combine the best features of the U and inverted-U types, and its advantages are discussed. The tower arrangement of variant 8, illustrated in Figure 7, has not yet been applied to large boilers in the Soviet Union, although there is considerable experience of it in boilers of medium output. The advantages and disadvantages of this arrangement are examined. The design of screens is then considered at some length and the respective merits of horizontal and vertical tube arrangements are discussed. Design data for the three arrangements of vertical screens illustrated diagrammatically in Figure 8 are given in Table 2. The

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data show that a radiant super-heater of type III of Table 2 gave the best performance. This system also has the advantage that the flows of heat and water can be controlled independently for each half of the boiler. Thus, dividing the furnace into a number of sections each with its own combustion process results in greater thermal uniformity and permits of more flexible control of the individual heating surfaces. Sub-division of the furnace by a number of vertical screens offers the designer new possibilities. The arrangement of the boiler relative to the turbine is most important, particularly in limiting the lengths of steam piping. The super-heater outlets must be on the convective side of the boiler and if this side is facing the turbine room the total length of steam piping from the boiler to the turbine can be cut to 40 - 50 m. The influence of boiler design and arrangement in cutting down the power consumption of auxiliary mechanisms may be judged from the data in Table 3, which shows the resistances and power consumptions of individual parts of the boiler equipment such as the feed pump and draught fans. The data show

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that the reduction in the length of pulverised-fuel lines when the bunker is located on top of the furnace as against the usual inverted-U arrangement is equivalent to reducing the hydraulic resistance of the boiler by 7.4 atm. It will also be seen that a first essential of boiler design and arrangement is to minimise the resistance of the gas/air tract. The main characteristics of a boiler designed according to variant 7 are tabulated in Table 4. It is stated that variants differ in metal content by 650 tons and in thermal insulation by 280 tons. It is better to compare the variants by metal consumption than by cost, as the latter depends on rather arbitrary factors such as factory overheads and development costs.
There are 8 figures and 4 tables.

ASSOCIATION: Vsesoyuznyy teplotekhnicheskiy institut - Orgenergostroy (All-Union Thermo-Technical Institute - Orgenergostroy)

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Calculating metal pressure on the rolls during the rolling of bimetals. Izv.vys.uchseb.zav.; tsvet.met. 8 no.2,140-146 '65. (MIRA 19:1)

1. Vsesoyuznyy nauchno-issledovatel'skiy institut zheleznodorozhnogo transporta.

RAKOV, K.M., inzh.

Manufacture of bimetal strips with aluminum-tin alloys. Trudy TSNII MPS no.277:72-81 '64. (MIRA 17:6)

RAKOV, L.A.; KAZAKOV, A.K.; SHPAYKHER, V.I.

Vacuum unit for light annealing. Mashinostroitel' no.3:34 Mr '63. (MIRA 16:4)
(Titanium alloys—Heat treatment)

RAKOV, M.A.

Synthesis method for passive two-terminal networks. Avtom.kont. i izm.tekh. no.4:58-89 '60. (MIRA 13:8)
(Electric networks)

NAGORNYY, L.Ye.; RAKOV, M.A.

Layout for obtaining large time delays in transistor circuits. (MIRA 13:8)
Avtom.kont.i izm.tekh. no.4:121-123 '60.
(Transistor circuits) (Pulse techniques (Electronics))

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9.2560(1624, 1154, 1161)

AUTHORS: L.Ya. Nagornyy, and M.A. Rakov

TITLE: Synthesis of internal feedback neutralization networks in transistor circuits

SOURCE: Akademiya nauk Ukrayins'koyi RSR. Instytut mashynoznavstva i avtomatyky, L'viv. Avtomaticheskiy kontrol' i izmeritel'naya tekhnika. no. 5, Kiev, 1961, 55 - 63

TEXT: It is possible to show that the connection of suitable external circuits to an active non-unidirectional element (e.g. a transistor) can neutralize the effects of internal feedback in this element. A circuit with unwanted internal feedback can be represented in the form of a four-terminal network a,b,c,d (Fig. 1) with the base terminal 0 inside it, having a load Y_1. Equations for U_1 and U_2 are given and a condition for feedback neutralization found. Using this condition and the known frequency response characteristics of transistors and other circuit elements, frequency response characteristics of equivalent two-terminal neu-

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tralizing networks are calculated. A method of determining approximate immitance of any two-terminal network element is given. As an example of constructive network synthesis, neutralization of the internal feedback of a two-stage transistor amplifier (Fig. 2) is examined. It is assumed that the characteristic conductances of both transistors are known. Indeterminate matrices of the conductances are given for both transistors. The determinate matrix of conductance is obtained directly from Fig. (2) and the total algebraic addition is found. The operation with algebraic addition renders it possible to choose the quantity, connection points and to determine the character of frequency relationships of separate neutralizing networks. Finally, analyzing the algebraic addition an expression is obtained which becomes equal to zero under certain conditions. Fig. (3) depicts one of the methods of internal feedback neutralization. Here the feedback in the first transistor is neutralized by means of a bridge circuit. The negative feedback in the second transistor is neutralized by means of a transformer and a conductance Y_{k2}. In this way the amplifier is converted into a unidirectional device. The above method of constructive synthesis can be applied to circuits with thermionic val-

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31459
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9,2530

AUTHORS: M.A. Rakov, and L.A. Sinitskiy

TITLE: Magnetic frequency dividers

SOURCE: Akademiya nauk Ukrayins'koyi RSR. Instytut mashynoznavstva i avtomatyky, L'viv. Avtomaticheskiy kontrol' i izmeritel'naya tekhnika. No. 5, Kiev, 1961, 71 - 77

TEXT: This article describes the performance and the applications of magnetic frequency dividers. An important version of frequency dividers is an instrument dividing the frequency by two (Fig. 1). The secondary is an oscillating circuit with variable natural frequency. The windings w, connected to an alternating voltage source via a resistance R, and a diode act as both exciting and magnetizing windings. Six differential equations defining the frequency divider are given. These equations are difficult to solve. Therefore this frequency divider was very thoroughly examined experimentally. The regions of stable and reproducible conditions of frequency division and the relationships between power transfer coefficient and circuit parameters were examined. The operation of magnetic frequency divider depends on primary voltage, frequency, load and other parameters. The increase of C results in widening the limits of stable operation but this causes an increase of threshold voltages of the initiation of frequency division. The optimum power transfer coefficient in the circuit under test reaches 20 %. The shape of the output voltage curve is practically independent of the shape of supply voltage waveform, provided the magnets operate in the saturated condition. The divider output voltage does not contain any even harmonics, even if the supply voltage is distorted. This property is important when the divider is used as a source of supply for the second harmonic magnetic modulator. The frequency divider can be used in those cases where a 90° phase shift at halved frequency between two voltages is required. Tests of an arrangement utilizing two frequency dividers for the purpose of quadrature shift proved that the operation did not depend on either frequency, load or paramenter variations with time. There are 6 figures and 3 Soviet-bloc references.

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Magnetic frequency dividers

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AUTHOR: Rakov, M.A.

TITLE: Producing Phase-shifts by Means of Frequency Dividers

PERIODICAL: Pribory i tekhnika eksperimenta, 1961, No. 2, pp. 110 - 112

TEXT: There exists a possibility of producing phase-shifts by means of frequency changers. Thus, if at the input of two devices two signals of frequency f_1, shifted in phase by 180°, are applied and the output produces a frequency f_2 such that:

$$f_2 = nf_1 \qquad (1),$$

then assuming that in the secondary circuit there exists only a unique periodic operating condition, the phase-shift between the voltages at the output (taking into account the frequency change) will be equal to:

$$\varphi = n\pi \qquad (2).$$

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If now 1/n is an integer, which means that the frequency is divided an integral number of times, the phase-shift will be equal to a portion of the initial shift. For example, for n = 1/2 it is possible to obtain a phase-shift of 90° between the output voltages and for n = 1/3 the phase-shift is 60°. The phase-shift of 90° is of particular interest. In this case, it is possible to use frequency dividers based on magnetic elements; these are advantageous in having a wide bandwidth, high efficiency and large output powers. The most suitable magnetic dividers (Refs. 1, 2) are the devices containing a rectifier in the excitation winding (this is illustrated in Fig. 2); these have the advantage that they do not require a separate source of direct current. Experimentally, it is known that such a system can operate satisfactorily over a wide range of voltages and frequencies. Another advantage of this divider is the fact that the output voltage does not contain any even harmonics (this is illustrated in the oscillogram of Fig. 4). This property is particularly useful in the case when voltages shifted by 90° are used for supplying

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a magnetic modulator. A complete circuit for producing a 90° phase-shift is given in Fig. 5. Here, the potentiometer R_1 is used for controlling the output voltages U_1 and U_2. Over a wide range of operating conditions, the device gives a stable phase-shift which is independent of frequency or load. The device is very simple and does not require any adjustment. There are 6 figures and 3 Soviet references.

ASSOCIATION: Institut mashinovedeniya i avtomatiki AN UkrSSR (Institute of Machine Technology and Automatics of the Ukrainian SSR)

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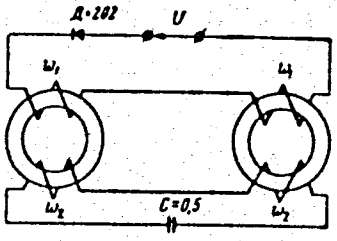
Fig. 2:

w_1 = 500 turns; w_2 = 2 000 turns; wired with PEShO (PEShO) ϕ 0.15, cores of permalloy 79NM (79NM), 35 rings, δ = 0.1 mm, S = 0.05 cm^2 (where S is the transverse cross-section of the core).



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